East Krause Lake

Site Description

Location

Water designation number (WDN)	22-0053-00
Legal description	T124N-R56W-Sec 25
County (ies)	Day
Location from nearest town	1.0 mile west and 1.5 miles north of Roslyn, SD

Survey Dates and Sampling Information

Survey dates	August 20-21, 2013 (FN,GN)
Frame net sets (n)	12
Gill net sets (n)	3

Morphometry (Figure 1)

Watershed area (acres)	38,077
Surface area (acres)	≈175
Maximum depth (ft)	≈20
Mean depth (ft)	unknown

Ownership and Public Access

East Krause Lake is a non-meandered lake that covers both public and private property. The fishery is managed by SDGFP. A primitive boat ramp (i.e., constructed using over-sized rock and gravel) located east of 435th Avenue provides public boat access to the lake (Figure 1). Shorefishing opportunities exist along 435th Avenue which divides East and West Krause Lakes. Lands adjacent to the lake are owned by the State of South Dakota and private individuals.

Watershed and Land Use

The 38,077 acre Opitz Lake sub-watershed (HUC-12) encompasses East Krause Lake and is located within the larger Northern Coteau Lake-Upper James River (HUC-10) watershed. Land use within the watershed is primarily agricultural including a mix of pasture or grassland, cropland, and scattered shelterbelts.

Water Level Observations

Water levels on East Krause Lake are not monitored by SDDENR.

Fish Management Information

Primary species	Walleye, Yellow Perch
Other species	Black Bullhead, Black Crappie, Common Carp, Green Sunfish
Lake-specific regulations	none
Management classification	none
Fish consumption advisories	none

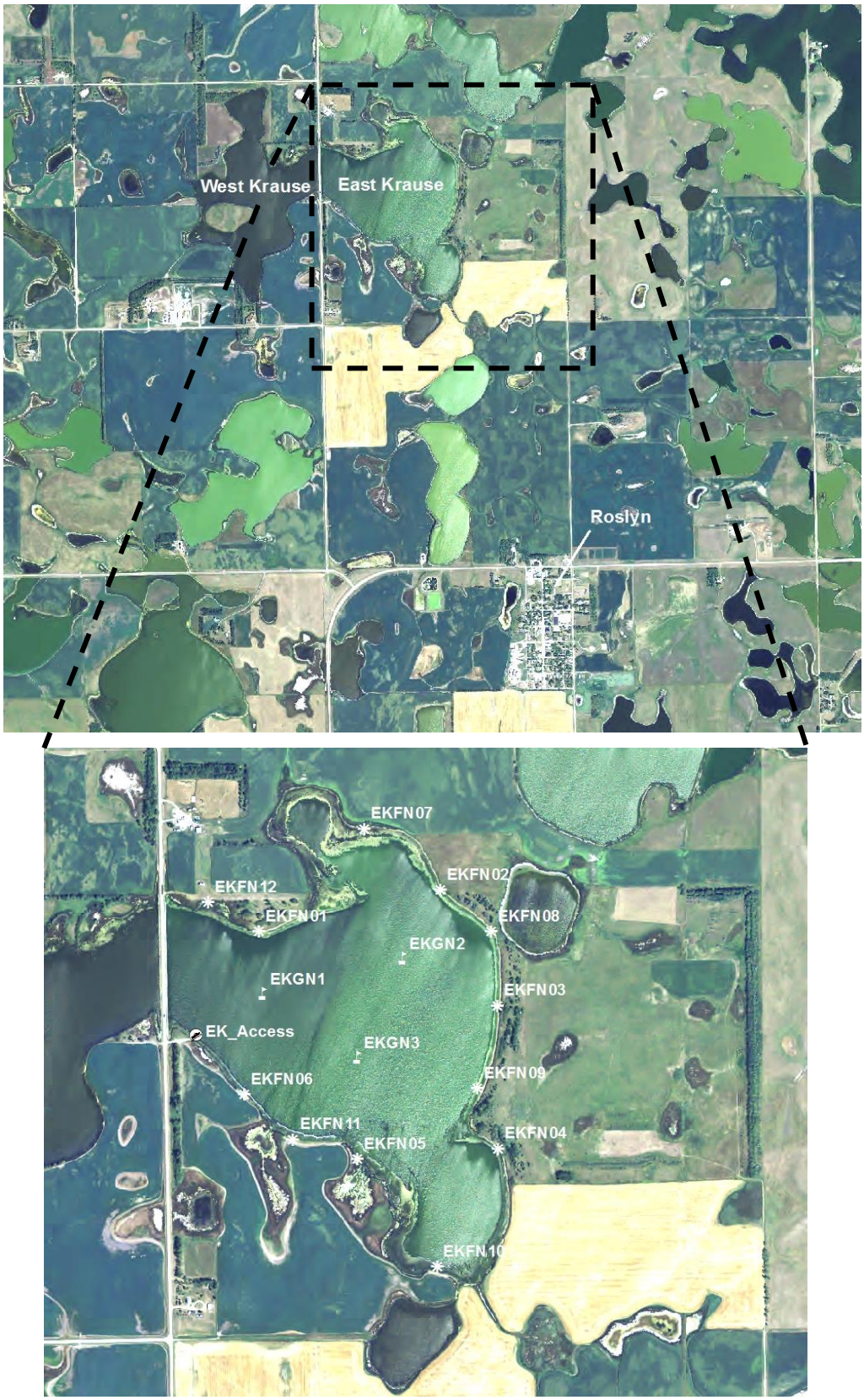

Figure 1. Map depicting geographic location of East and West Krause Lakes from Roslyn, South Dakota (top). Also noted is the access point and standardized net locations for East Krause Lake (bottom). EKFN= frame nets; EKGN= gill nets

Management Objectives

1) Maintain a mean gill net CPUE of stock-length Walleye ≥ 10, a PSD of 30-60, and a PSD-P of 5-10.

2) Maintain a mean gill net CPUE of stock-length Yellow Perch ≥ 30, a PSD of 30-60, and a PSD-P of 5-10.

Results and Discussion

East Krause Lake is a 175 acre natural lake located near Roslyn, South Dakota. During the 1990s, abundant precipitation and the resulting run-off increased the water depth and surface area of East Krause Lake, which created habitat capable of sustaining a sport fishery. In 1998, an initial stocking of saugeye (Sauger X Walleye hybrid) was conducted (Table 6). Soon thereafter (i.e., within 2-3 years), the lake became a popular destination for anglers. Currently, East Krause Lake is managed as a Walleye and Yellow Perch fishery.

Primary Species

Walleye: The mean gill net CPUE of stock-length Walleye was 8.0 (Table 1) and below the minimum objective (≥ 10 stock-length Walleye/net night). Based on the 2013 gill net CPUE, relative abundance is considered moderate.

Walleye captured in the gill net catch ranged in TL from 14 to 48 cm (5.5 to 18.9 in), had a PSD of 25 and a PSD-P of 0 (Table 1; Figure 2). Both the PSD and PSD-P were below the management objectives of 30-60 and 5-10, respectively. However, size structure indices should be interpreted with caution as sample size was low (i.e., 24 stock-length Walleye).

Based on ages obtained using otoliths, three year classes (2010, 2012, and 2013) were present in the sample (Table 4). Year classes produced in 2010 and 2012 coincided with fry stockings and collectively comprised 96% of Walleye in the gill net catch; while the 2013 cohort, which was represented by a single individual, was the result of natural reproduction (Table 4; Table 6). The contribution of natural production to year classes produced during stocked years is unknown, as stocked fry were unmarked making it difficult to differentiate stocked from naturally-produced fish.

Although sample sizes were low, Walleye in East Krause Lake appear to exhibit fast growth. In 2013, the weighted mean TL at capture of age-1 (2012 year class) and age-3 (2009 year class) Walleye was 290 and 467 mm (11.4 and 18.4 in; Table 5).

Yellow Perch: The mean gill net CPUE of stock-length Yellow Perch was 14.0 (Table 1) and below the minimum objective (≥ 30 stock-length Yellow Perch/net night; Table 3). Based on the 2013 gill net catch, relative abundance appears to be moderate.

Gill net captured Yellow Perch ranged in TL from 13 to 24 cm (5.1 to 9.4 in), had a PSD of 17 and a PSD-P of 0 (Table 1; Figure 3). Both the PSD and PSD-P were below management objectives of 30-60 and 5-10 (Table 3), indicating a population primarily comprised of smaller (i.e., ≤ 20 cm; 8 in) individuals (Figure 3).

Otoliths were collected from a sub-sample of gill net captured Yellow Perch. Age structure information suggested the presence of two year classes (2011 and 2012; Table 7). The 2012 year class was the most represented and comprised 79% of Yellow Perch in the gill net catch; while the 2011 cohort accounted for the remaining 21% (Table 7). The weighted mean TL at capture for age-1 and age-2 male Yellow Perch was 149 and 194 mm (5.9 and 7.6 in); while the weighted mean TL at capture for age-1 and age-2 female Yellow Perch was 156 and 228 mm (6.1 and 9.0 in), respectively (Table 8). The majority of gill net captured Yellow Perch were in the stock- to quality-length category, which had a mean Wr of 95.

Other Species

Black Bullhead: Black Bullheads were the most abundant fish species in both the frame net and gill net catch (Table 1). The mean frame net CPUE for stock-length Black Bullhead was 24.6 (Table 1) and indicated moderate to high relative abundance.

Frame net captured Black Bullhead ranged in TL from 12 to 34 cm (4.7 to 13.4 in). A high proportion (85%) ranged in TL from 19 to 26 cm (7.2 to 10.2 in). The PSD was 45 and the PSD-P was 2. No age and growth information was collected in 2013. Mean Wr values of Black Bullheads in the frame net catch ranged from 79 to 88 for all length categories (e.g., stock to quality) sampled, with the mean Wr of stock-length fish being 80 (Table 1).

Black Crappie: Black Crappie were first sampled from East Krause Lake in 2006 (Table 2). In 2010, approximately 10,080 fingerlings were stocked to bolster the population. Unfortunately, frame nets utilized during the 2013 fish community survey captured few Black Crappie. The mean frame net CPUE of stock-length crappie was 0.3 (Table 1). Few inferences can be made concerning sizes structure, growth and/or condition due to the low sample size. Although relative abundance is currently low, adult Black Crappie are present and the possibility exists for the population to expand.

Other: Green Sunfish was the only other fish species captured during the 2013 fish community survey (Table 1).

Management Recommendations

1) Conduct fish community assessment surveys on an every third year basis (next surveyed scheduled for summer 2016) to monitor fish relative abundance, fish population size structures, fish growth, and stocking success.

2) Stock Walleye on a biennial basis (≈500 fry/acre) to establish additional year classes.

3) Collect otoliths from Walleye and Yellow Perch to assess age structure and growth rates of each population.

4) Monitor winter and summer kill events. In cases of substantial winter/summer kill the need to re-establish a fishery in East Krause Lake should be evaluated. If water levels are sufficient, Walleye and Yellow Perch should be stocked to re-establish a fish community.

Table 1. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length fish (PSD-P), and mean relative weight (Wr) of stock-length fish for various fish species captured in frame nets and experimental gill nets from East Krause Lake, 2013. Confidence intervals include 80 percent (± CI-80) or 90 percent (± CI-90). BLB= Black Bullhead; BLC= Black Crappie; GSF= Green Sunfish; WAE= Walleye; YEP= Yellow Perch

	Abundance		Stock Density Indices				Condition	
Species	CPUE	CI-80	PSD	CI-90	PSD-P	CI-90	Wr	CI-90
Frame Nets								
BLB	24.6	10.5	45	5	2	1	80	1
BLC	0.3	0.2	33	67	33	67	109	18
GSF	1.9	1.2	0	---	0	---	93	2
WAE	3.3	2.9	30	12	5	6	92	1
YEP	5.6	2.5	3	3	1	2	87	<1
Gill Nets								
BLB	33.7	24.2	39	8	5	4	96	1
WAE	8.0	5.8	25	15	0	---	97	1
YEP	14.0	5.4	17	10	0	---	96	1

Table 2. Historic mean catch rate (CPUE; catch/net night) of stock-length fish for various fish species captured in frame nets and experimental gill nets from East Krause Lake, 2004-2013. BLB= Black Bullhead; BLC= Black Crappie; GSF= Green Sunfish; SXW= saugeye (Sauger X Walleye hybrid); WAE= Walleye; YEP= Yellow Perch

	CPUE				
Species	2004	2005	2006	2007	2013
Frame Nets					
BLB	---	---	---	---	24.6
BLC	---	---	---	---	0.3
GSF	---	---	---	---	1.9
WAE	---	---	---	---	3.3
YEP					5.6
Gill Nets					
BLB	3.0	11.7	3.7	3.7	33.7
BLC	0.0	0.0	8.7	0.7	0.0
SXW	0.3	0.0	0.0	0.3	0.0
WAE	1.0	12.7	31.3	1.3	8.0
YEP	33.3	15.3	35.7	65.3	14.0

Note: From 2007-2010, the fish community in East Krause Lake was monitored as part of research being conducted through South Dakota State University examining the influence of Gizzard Shad introductions into northeastern South Dakota glacial lakes (i.e., East Krause, Lardy and Mid-Lynn; VanDeHey 2011).

Table 3. Mean catch rate (CPUE; catch/net night) of stock-length fish, proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish, and mean relative weight (Wr) for selected species captured in experimental gill nets from East Krause Lake, 2004-2013. WAE = Walleye; YEP = Yellow Perch

Species	2004	2005	2006	2007	2013	Objective
Gill nets						
WAE						
CPUE	1	13	31	1	8	≥ 10
PSD	33	5	33	100	25	30-60
PSD-P	33	5	6	0	0	5-10
Wr	---	93	88	87	97	---
YEP						
CPUE	33	15	36	65	14	≥ 30
PSD	10	26	73	7	17	30-60
PSD-P	3	4	19	4	0	5-10
Wr	94	100	99	100	96	---

Note: From 2007-2010, the fish community in East Krause Lake was monitored as part of research being conducted through South Dakota State University examining the influence of Gizzard Shad introductions into northeastern South Dakota glacial lakes (i.e., East Krause, Lardy and Mid-Lynn; VanDeHey 2011).

Table 4. Year class distribution based on the expanded age/length summary for Walleye sampled in gill nets and associated stocking history (# stocked x 1,000) from East Krause Lake, 2006-2013.

	Year Class									
Survey Year	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004
2013	1	18		6						
2007[1]	---	---	---	---	---	---				4
2006[1,2]	---	---	---	---	---	---	---		27	62
# stocked										
fry		90		200	200	200				400
sm. fingerling										36
lg. fingerling									2	

[1] Monofilament gill net mesh size change (0.75", 1.00", 1.25", 1.50", 2.00" and 2.50")
[2] Older Walleye/saugeye from year classes produced in 1995 (1), 1997 (2), 1998 (1), and 2001 (1) were sampled but are not reported in this table. Parentheses indicate number sampled.

Table 5. Weighted mean length at capture (mm) for Walleye/saugeye captured in experimental gill nets (expanded sample size) from East Krause Lake, 2005-2013. Note: sampling was conducted at approximately the same time during each year allowing comparisons among years to monitor growth trends.

	Age										
Year	0	1	2	3	4	5	6	7	8	9	10
2013	141(1)	290(18)	---	467(6)	---	---	---	---	---	---	---
2007	---	---	---	438(4)	---	---	---	----	---	---	----
2006[1]	---	288(27)	375(62)	---	---	547(1)	---	---	648(1)	618(2)	---
2005	---	270(47)	---	---	---	670(1)	---	---	---	---	648(1)

[1] Older Walleye/saugeye were sampled but are not reported.

Table 6. Stocking history including size and number for fishes stocked into East Krause Lake, 1998-2013. BLC= Black Crappie; GIZ= Gizzard Shad; SXW= saugeye; WAE= Walleye; YEP= Yellow Perch

Year	Species	Size	Number
1998	SXW	fingerling	75
	SXW	juvenile	1,184
1999	SXW	fingerling	832
	WAE	fingerling	1,440
2004	WAE	small fingerling	35,800
		fry	400,000
2005	WAE	large fingerling	2,280
2008	GIZ	adult	50
	WAE	fry	200,000
	YEP	fry	183,000
2009	GIZ	adult	50
	WAE	fry	200,000
	YEP	fry	188,000
2010	BLC	fingerling	10,080
	WAE	fry	200,000
2012	WAE	fry	90,000

Table 7. Year class distribution based on the expanded age/length summary for Yellow Perch sampled in gill nets from East Krause Lake, 2013.

	Year Class		
Survey Year	2013	2012	2011
2013		33	9

Table 8. Weighted mean TL (mm) at capture by gender for Yellow Perch captured in experimental gill nets (expanded sample size) from East Krause Lake, 2013.

	Age		
Year	1	2	3
2012			
Male	149 (13)	194 (3)	---
Female	156 (20)	228 (6)	---
Combined	153 (33)	217 (9)	---

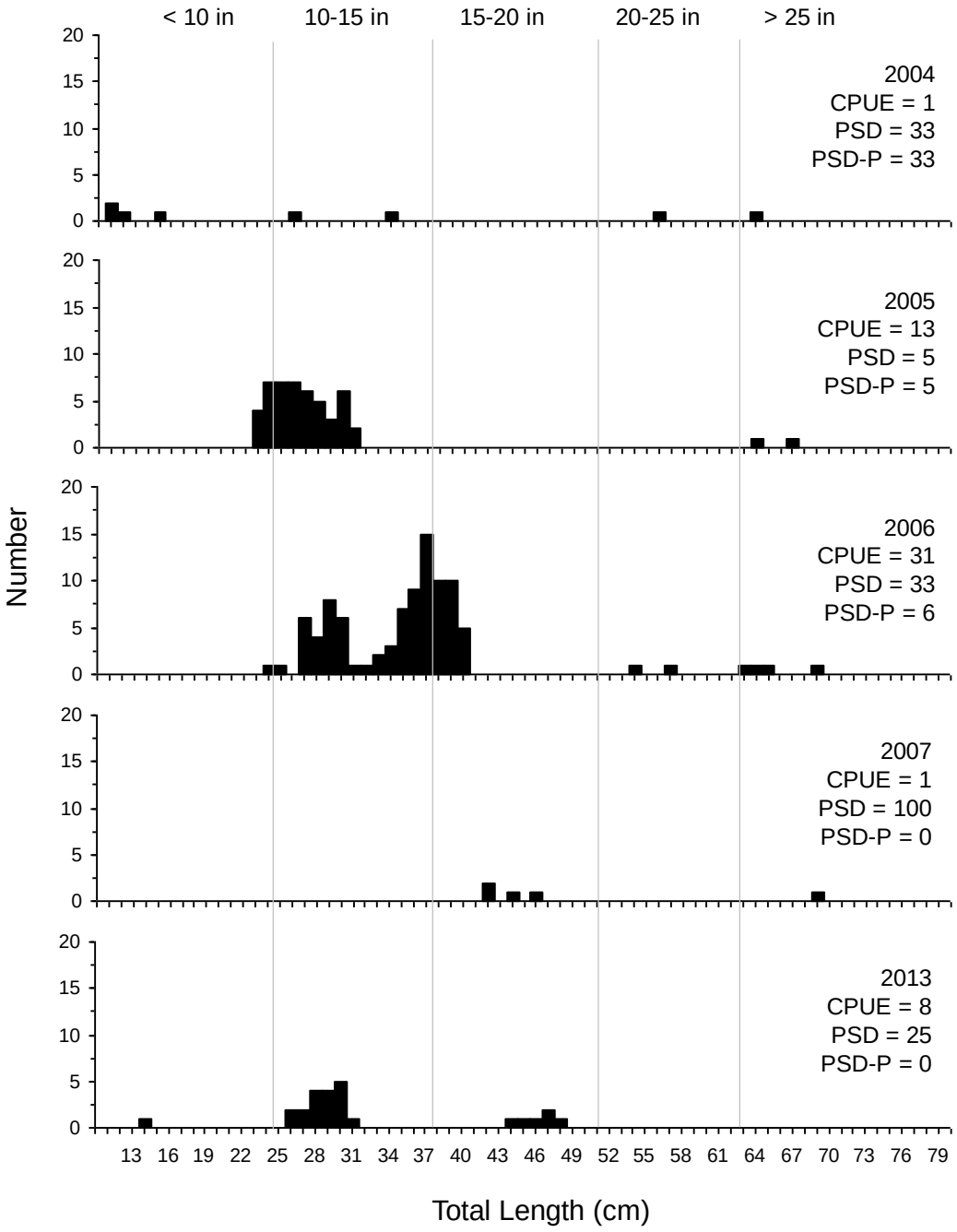

Figure 2. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Walleye captured using experimental gill nets in East Krause Lake, 2004-2013.

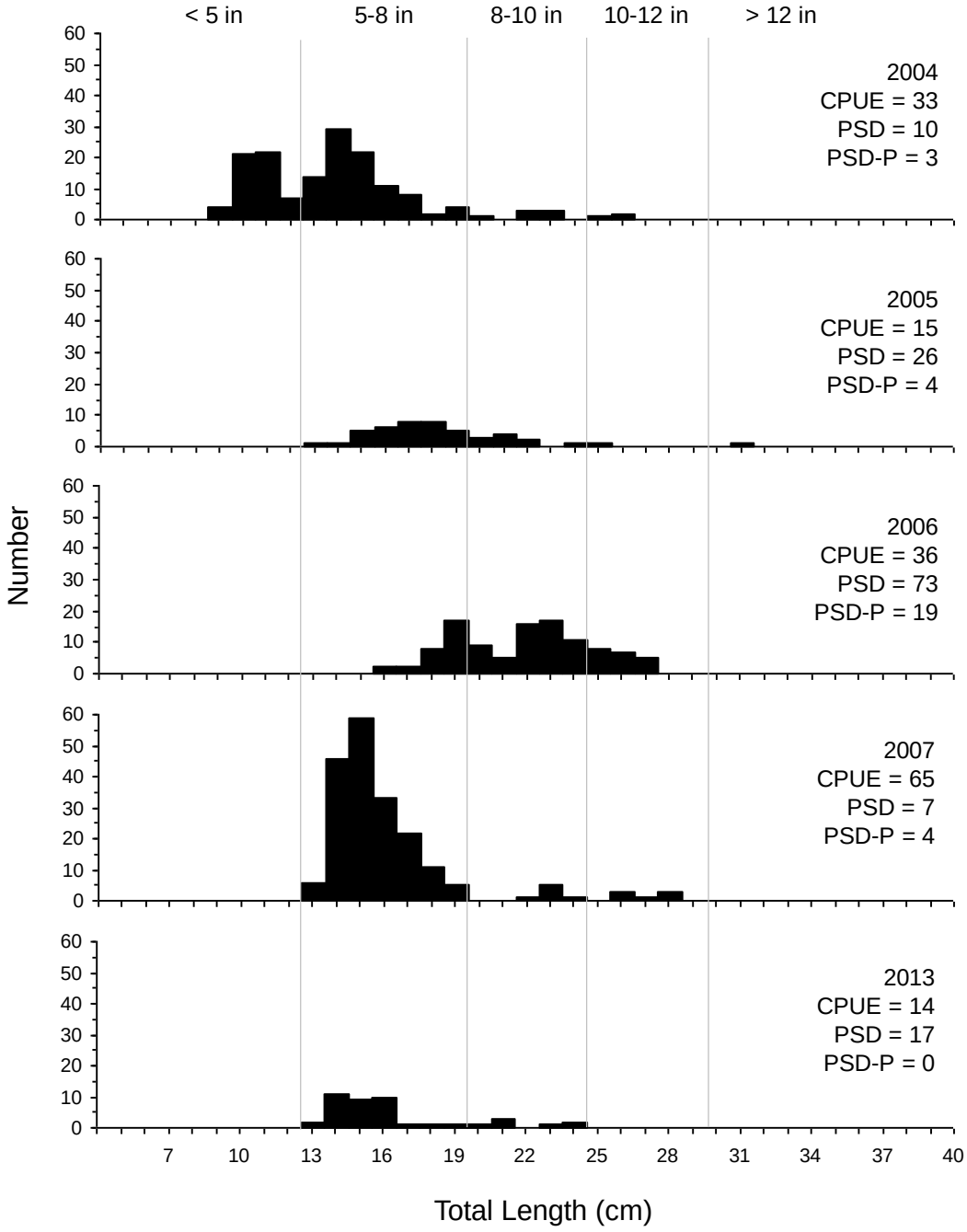

Figure 3. Length-frequency histogram, catch rate of stock-length fish (CPUE), proportional size distribution of quality- (PSD) and preferred-length (PSD-P) fish for Yellow Perch captured using experimental gill nets in East Krause Lake, 2004-2013.